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# REPORT

of the

# SIXTH NORTHEASTERN CORN IMPROVEMENT CONFERENCE,

New Brunswick, New Jersey
February 5-6, 1951

Reported by
William R. Findley, Jr., Acting Secretary

Division of Cereal Crops and Diseases
Bureau of Plant Industry, Soils, and Agricultural Engineering
Plant Industry, Station, Beltsville, Maryland
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# REPORT OF THE SIXTH NORTHEASTERN CORN IMPROVEMENT CONFERENCE

New Brunswick, New Jersey
February 5-6, 1951

Reported by William R. Findley, Jr.,[1/] Acting Secretary

## AFTERNOON MEETING, MONDAY, FEBRUARY 5

The afternoon meeting of the Sixth Northeastern Corn Improvement Conference was held in room 116 of Lipman Hall, the new Plant Science Building, Rutgers University.

The meeting was called to order by Chairman J. C. Anderson at 1:30 p. m. Dr. Anderson introduced Director W. H. Martin who welcomed the group to New Jersey and made a few timely remarks relative to the importance of agriculture during the national emergency. Dr. Martin pointed out that in times of stress farmers turn to agricultural experiment stations for assistance and guidance more than at any other time. At the beginning of World War II a backlog of research existed to help us through that crisis, today no such backlog exists, he said.

Those present expressed their regret that Dr. Jenkins was unable to attend the meeting and give his talk "Corn Hybrids in Europe."

### Plans for Cooperative Uniform Tests

The first item of business concerned inbred lines to be included in making up the uniform single cross tests of the various maturity groups. It was decided to drop the Illinois 448 maturity group for this year and the selection of inbreds for the W240 group was left to the evening meeting of the committee assigned to this group.

Some difficulty arose in assigning inbreds to maturity groups. The feeling of the conference was that more information was needed on flowering dates of inbreds under the environmental conditions of the Northeastern regions.

D. F. Jones raised the question regarding the handling of related lines to avoid unnecessary repetition in testing. Some discussion of this question followed. Inbreds tentatively assigned to maturity groups for tests of all combinations of single crosses were as follows:

---

1/ Assistant Agronomist, Division of Cereal Crops and Diseases, Plant Industry Station, Beltsville, Maryland

| W412 | M15 | K24 |
|---|---|---|
| W-M13 | Oh (26) 26A | WF9 |
| C105 | Oh51 | Oh51A |
| A97 | Ill. A | N.J. 7-269 |
| Pa.54 | W23 | Ia.B9 |
| Pa.11 | Pa.54 | A375 |
| Ia.153 | Pa,55 | A374 |
| A206 | A73 | Conn. 1003 |
| A71 | A206 | Oh43 |
| N.Y. WH1 | N.Y. 3 | Pa.83H |
| Pa.32Q | M14. | Pa.B8 |
| | Oh05 | |

| Ia.4059 | U.S. 13 |
|---|---|
| WF9 | L317 |
| Hy2 | WF9 |
| I205 | Hy2 |
| Ia.70 | 38-11 |
| Oh43 | Oh29 |
| Oh29 | K171 |
| W22 | K214 |
| Ind. H | R64 |
| B35 | R65 |
| Oh45 | W102 |
| Oh5 | C103 |
| K159 | Oh45 |
| K237 | Conn. 1016 |
| W146 | Pa.70 |
| Pa.86 | Oh7A |
| | C107 |
| | W.Va. 38-11 I B |

The respective committees agreed to make final selection of inbreds to be included in each group after the 1950 report on the uniform tests is studied.

Chairman Anderson next called for reports from standing committees.

## Report of the Committee on the Uniform Tests of Double Crosses

H. L. Everett presented the following report on the 1950 uniform tests of double crosses of U. S. 13 maturity sponsored by the Northeastern Conference.

The 1950 trials were grown in Connecticut, Maryland, New Jersey, Pennsylvania and West Virginia. All Stations reported successful trials and the data have been summarized in Table II. N.E. 8814, (C102 x C103)x(38-11 x K155), and N.E. 8804 (C102 x Oh7A)x(Hy2 x 38-11) were consistently high in yield and above average for other plant attributes. DeKalb 840 and 825, as well as Oh3147 and Pioneer 300, were apparently unadapted to the northeastern environmental conditions. However, some of the differences in yield capacity noted in this summary must be attributed to the fact that hand produced seed has a purity and/or treatment advantage over commercially produced seed.

Table I shows the diversity of the data reported by the various cooperators and is presented as a guide to information limited to one or two Stations, and hence, not included in the summarized table.

Table I. Data available 1950.

| Character | Station | | | | |
|---|---|---|---|---|---|
| | Connecticut | Maryland | New Jersey | Pennsylvania | West Virginia |
| Yield | X | X | X | X | X |
| % Moisture | X | X | X | X | X |
| % Stand | X | X | | X | X |
| Stalk Rot | | | X | X | |
| Broken Plants | X | X | X | | |
| Unsound ears | | X | | | |
| Days to ½ silks | X | X | | X | |
| Turc. blight 1-5 | | | | X | |
| Mg. 1-5 | | | | X | |
| Birds | | | | X | |
| Ears-Uniformity and general appearance 1-5 | | | | X | |
| Lodged Plants | X | | | | |
| Planting Date | June 9 | June 9 | | | May 25 |
| Harvest Date | Nov.2 | Nov. 11 | | | Oct. 26 |

Table II. Summary of tests repeated in five locations in 1950

| Pedigree | Yield in Terms of Rank* | Av. % Moisture | Av. % Broken | Av. % Stand | Av. Days to 1/2 silk |
|---|---|---|---|---|---|
| NE8814 | +1.670 | 29.7 | 2.5 | 78 | 77 |
| NE8804 | +1.212 | 31.0 | 6.7 | 76 | 77 |
| NE8862 | + .899 | 28.7 | 4.8 | 81 | 75 |
| Md 990 | + .751 | 31.3 | 3.6 | 84 | 75 |
| NE7814 | + .664 | 31.3 | 3.5 | 82 | 76 |
| NE8835 | + .655 | 30.4 | 5.2 | 81 | 77 |
| NE8824 | + .579 | 28.3 | 5.7 | 77 | 75 |
| NE8803 | + .542 | 33.0 | 6.0 | 86 | 78 |
| NE8854 | + .519 | 31.3 | 4.6 | 84 | 78 |
| NE8833 | + .491 | 29.3 | 6.2 | 75 | 75 |
| NE7879 | + .471 | 31.6 | 6.1 | 84 | 78 |
| NE8806 | + .470 | 31.0 | 6.9 | 81 | 77 |
| NE6343 | + .462 | 31.8 | 5.7 | 85 | 74 |
| NE8818 | + .440 | 34.2 | 4.9 | 74 | 79 |
| NE6816 | + .437 | 31.3 | 9.0 | 80 | 74 |
| Conn..870S | + .428 | 30.3 | 8.1 | 76 | 74 |
| NE7815 | + .375 | 29.5 | 3.5 | 78 | 76 |
| NE8877 | + .374 | 33.0 | 4.2 | 71 | 78 |
| Pa.8811 | + .371 | 31.5 | 2.9 | 76 | 78 |
| NE7803 | + .357 | 31.1 | 4.4 | 83 | 75 |
| NE8831 | + .301 | 30.6 | 5.6 | 77 | 76 |
| NE8836 | + .289 | 32.9 | 6.1 | 81 | 79 |
| NE8872 | + .288 | 33.2 | 5.2 | 85 | 78 |
| NE8867 | + .281 | 32.8 | 9.0 | 80 | 77 |
| NE8823 | + .176 | 33.8 | 7.1 | 85 | 79 |
| Md. 988 | + .127 | 30.0 | 5.7 | 72 | 75 |
| NE8849 | + .120 | 32.4 | 4.0 | 76 | 78 |
| NE8810 | + .062 | 33.1 | 4.4 | 74 | 78 |
| Funk G99 | + .026 | 30.1 | 5.7 | 79 | 77 |
| US 505 | - .172 | 31.9 | 2.7 | 77 | 76 |
| Conn. 830S | - .178 | 30.1 | 8.8 | 77 | 74 |
| W.Va. 1311 | - .189 | 29.8 | 3.9 | 83 | 77 |
| Md. 991 | - .201 | 31.0 | 4.1 | 76 | 75 |
| Md. 989 | - .221 | 30.8 | 3.3 | 71 | 75 |
| NE8802 | - .251 | 33.7 | 6.0 | 71 | 78 |
| Pa. 840 | - .486 | 27.8 | 6.9 | 82 | 75 |
| US 13 | - .505 | 31.9 | 8.2 | 80 | 76 |
| NJ 7 | - .506 | 31.8 | 7.0 | 81 | 74 |
| Conn. 870F | - .522 | 32.0 | 4.2 | 74 | 75 |
| Pioneer 303 | - .560 | 29.2 | 3.3 | 81 | 73 |
| Conn. 830F | - .716 | 31.2 | 6.7 | 78 | 73 |
| Conn. 873F | - .718 | 28.5 | 4.3 | 79 | 75 |
| Md. 987 | - .749 | 33.0 | 7.7 | 75 | 76 |
| Conn. 873S | - .873 | 29.9 | 7.7 | 86 | 75 |
| Funk G98 | - .974 | 29.3 | 3.9 | 78 | 76 |
| Oh3147 | -1.089 | 30.8 | 5.8 | 78 | 74 |
| Pioneer 300 | - 1.116 | 28.8 | 7.9 | 81 | 76 |
| DeKalb 825 | - 1.553 | 31.1 | 5.8 | 82 | 75 |
| DeKalb 840 | - 1.708 | 31.6 | 5.9 | 78 | 76 |
| * L.S.D. 5% | .990 | | | | |

Dr. Everett asked for opinions regarding the presentation of these data. He particularly desired to know whether the conference preferred individual location summaries or if the average as presented (table 1) was satisfactory.

L. L. Huber indicated he preferred individual summaries as it permitted better evaluation of the performance of a hybrid in a specific area. Yield summaries tend to be somewhat misleading.

The consensus of the group was that individual reports would be more desirable.

H. L. Everett pointed out the necessity for all cooperators to contribute information on characters that may be evaluated at all locations. He also asked how many entries should be included in the test.

After some discussion it was agreed to restrict the number of entries to 25 and to limit the number of commercial hybrids tested to three. A 5 x 5 triple lattice design seemed most desirable.

J. C. Anderson, raised the question regarding hand pollinated seed vs. commercially produced seed, i.e., how much of the reduction in yield of commercial hybrids included in the uniform tests could be attributed to seed production methods. Dr. Everett's report referred to this as the cause of some differences in yields obtained.

D. F. Jones favored including both seed produced by hand pollination and seed produced commercially, by detasseling, in the uniform double cross test.

L. L. Huber discussed the possibilities of substituting observation planting for yield tests to obtain a preliminary evaluation of hybrids before including them in the uniform test. This procedure, it was felt, would relieve some of the pressure on the Northeastern conference to test commercial hybrids.

## Report of the Committee on the Registration of Eastland Hybrids

D. F. Jones, Committee Chairman, reported that no hybrids had been submitted to the Committee for registration.

## DISCUSSION OF RESEARCH PROBLEMS

Instead of each station presenting an individual report it was decided by the group to discuss current research under the following headings:

| | |
|---|---|
| Cold resistance tests | Disease |
| Single cross tests | Male sterility |
| Double cross tests | Cytogenetics |

## Cold Resistance Tests

NEW JERSEY

J. C. Anderson discussed the methods employed in cold tolerance studies. Seeds are planted in soil taken from fields where stalk rot is known to be present and incubated for 14 days at 50°F then placed at room temperature for 5 days.

PENNSYLVANIA

L. L. Huber explained the program to be started at Pennsylvania State College under the supervision of Dr. C. C. Wernham. Seeds are to be planted in unsterilized soils, sterilized soil and vermiculite and grown at temperatures of 45, 50 and 55 degrees Fahrenheit. Seven organisms including 4 species of Pythium and Gibberella will be added to each medium in all combinations of three or more. The duration of the cold test will be 7, 10 and 14 days. The strains will also be tested at one temperature.

CONNECTICUT

D. F. Jones discussed work on cold tolerance being done by Dr. Oscar Pearson at Eastern States Farmers Exchange. Seeds are germinated in paper dolls for 10 days at 50 degrees F, and 4 days at room temperature. Seedlings are tested in both sterilized and contaminated soil.

Selection for cold tolerance has produced some strains differing in response. A cold tolerant selection from Illinois A was reported. Considerable variability has been found by Dr. Pearson within inbred lines.

D. F. Jones

MOVED: That a committee be appointed to study cold testing problems.

Seconded and passed

Chairman Anderson appointed a committee consisting of C. C. Wernham, Chairman, H. L. Everett, and R. L. Cushing.

A discussion followed on the relation of the following factors to cold tolerance.

1. Seed treatment
2. Time of planting
3. Physiologic vs. genetic differences
4. Inbred and single cross contributions to double crosses.

R. L. Cushing proposed that the trials of inbred lines be grown at various locations to obtain information on flowering dates and other characters.

D. F. Jones suggested that it might be better to rate inbreds in preference to rating them in single crosses.

R. S. Wiggans

MOVED: A uniform test of field corn inbreds be planted to evaluate inbreds prior to testing in single crosses.

Seconded and passed

A discussion followed concerning suitable locations where the uniform inbred test should be planted. It was agreed some valuable information could be obtained even when inbreds were grown out of the area of adaptation.

The quantity of seed agreed upon for each location was 60 seeds to be planted, in a randomized block, with two replications, where the cooperator could make frequent observations.

R. G. Rothgeb

MOVED: A committee be appointed to present an outline of notes to be taken in the uniform tests of field corn inbreds.

Seconded and passed

Chairman Anderson asked L. L. Huber to act as Chairman of this committee and also asked C. M. Haenseler and R. G. Wiggans to serve on it.

## Single Cross Tests

NEW YORK

R. G. Wiggans discussed the single cross testing program at Cornell. A randomized block design with two replications is planted at each of three locations. The tests are planted thick and thinned to 14,000 plants per acre.

PENNSYLVANIA

L. L. Huber. Pennsylvania employs a triple lattice design with three replications planted at each of three locations. The rate of planting is 17,000 plants per acre, planted thick and thinned.

MARYLAND

R. G. Rothgeb uses a 7 x 7 lattice square design with tests at only one location. Stands are thinned to 10,000 to 12,000 plants per acre.

CONNECTICUT and NEW JERSEY

These two stations use stands of 14,000 plant per acre and 7 x 7 lattice designs.

Meeting adjourned at 5:30 p. m.

## EVENING SESSION, FEBRUARY 5

Mr. Norman F. Kennedy of Corn Industries Research Foundation spoke to the Conference following dinner in the University Commons. His topic was "The Corn Processor Talks to the Corn Breeder." Mr. Kennedy said the starch manufacturer must depend on the kernel by products for his margin of profit. This brought up the question of the desirability of raising the oil content of the kernel and also the amino acid level, particularly lysine and tryptophane. Research has shown this can be accomplished most effectively by increasing the germ size. He said, the facts indicate a pound of starch was replaced by a pound of oil in higher oil types.

Following the dinner the Conference members proceeded to the Hotel Roger Smith for committee meetings.

## MORNING SESSION, FEBRUARY 6

The meeting, held in the Dairy Science Building, was called to order by Chairman Anderson at 9:00 a. m.

### Report of the Committee on Uniform Tests of Double Crosses

L. L. Huber, Chairman of this committee, listed the following entries to be included in the 1951 uniform tests of double crosses.

| | |
|---|---|
| NE7803 | Md. 990 |
| NE7814 | N. J. 7 |
| NE8814 | Conn. 870 |
| NE8824 | U. S. 13 |
| NE8833 | DeKalb 840 |
| NE8849 | Funk 99 |
| NE8854 | Pioneer 303 |

The committee recommended the numbers of entries be limited to 25. This number to include not more than 3 closed pedigree hybrids.

Assignment of the remaining entries will be made after the 1950 uniform test report is consulted.

## Report of the Committee on Uniform Tests of Field Corn Inbreds

The Committee decided to limit the number of inbreds to be tested to 40. Each cooperator is to test the same inbreds, planted in two replications at a location where frequent observations are possible.

Notes on the following characters are to be recorded by the observer, insofar as possible.

1. Date of planting
2. First pollen shed - days from planting.
3. Days to half silk
4. Plant height - inches
5. Ear height - inches to node where ear attached
6. Shank length
   a. Short - almost sessile
   b. Medium - half length of ear
   c. Long - over half length of ear
7. Ear covering - rating 1 to 5
8. Percent broken stalks
9. Percent root lodged plants
10. Root strength - ratings 1 to 5 determined by pulling
11. Percent stalk rot
12. Leaf blight - turcicum and maydis
13. Smut - all
14. Percent aphid infested plants
15. Amount of pollen shed - good or poor

R. L. Cushing was appointed procurement agent for the inbred and single cross seed stocks. Each cooperator is to write to Dr. Cushing for seed of inbreds which he is interested in testing. He will write for the seed and have charge of the distribution of it.

## Report of the Committees on Uniform Tests of Single Crosses

The uniform tests of single crosses for 1952 will be limited to three maturity groups. Seed for each group will be made by the following stations:

| W412 | M15 | U.S. 13 |
|---|---|---|
| New York | New York | New York |
| Massachusetts | Pennsylvania | Maryland |
| Pennsylvania | | |

Crossed seed is to be produced in sufficient quantity to permit 6 tests of each group of single crosses.

## Report of the Committee on Sweet Corn Investigations

The committee members present (Suell, Everett, and Rothgeb) decided to recommend a continuation of the cooperative exchange of hybrids and inbreds for testing and observation in 1951.

In 1950 members of the sweet corn committee exchanged 22 hybrids and several inbred lines for observation. Cooperating stations were Connecticut, Maine, Maryland and New Jersey. The observations obtained for hybrids were based on one to three single-row plots at the several stations reporting. Records submitted covered up to 23 categories of plant and ear data. Not all entries were included at all four stations, and some records were not taken or were not complete at some stations. The accompanying table gives a summary for 12 types of observation. Choice of observation for the summary was influenced by (1) number of test locations, (2) pertinence to the evaluation of the hybrids, and (3) influence of personal and locational bias.

The summary includes data measuring rate of maturity, plant size, disease incidence, productivity, ear size, kernel size, and quality of raw kernels as judged by taste. Obviously the summary would be more valuable had data from all stations for all categories of observation been available. Fortunately, data for yield for most hybrids were available from all four locations. In order to lessen the effect of missing observations, yields of all hybrids were calculated in per cent of their respective test means and then the resulting percentage values from the several tests averaged to give the figures listed in the table.

In production of usable ears perhaps the most outstanding hybrid included in 1950 was N. J. 101. Despite its earliness as well as the fact that observations were made under markedly different growth conditions, this hybrid was well above the field average in weight and number of ears at all four locations. Moreover, it showed little disease injury and seemed to have acceptable plant and ear characteristics. Hybrids leading the respective tests in production of usable ears were as follows: Connecticut, N. J. Expt. 105; Maine, Md. Expt. 4; Maryland, Md. Expt. 3; New Jersey, Md. Expt. 4.

Special attention is called to the difference in rate of growth of the crop at the Maine station as compared to that at the Maryland station. At the former location these hybrids required an average of 73 days from a May-30 planting to the mid-silk date, while at the latter location with a June-16 planting only 55 days were required. It so happened that the Maine-Maryland averages for 17 hybrids included at all three locations did not vary more than 2 days from the respective maturity periods obtained for a May-24 planting at the New Jersey station.

As might be expected, the agreement for taste scores was not too good. As a result, differences tended to cancel out leaving most entries with an average reading.

In general the data supplied by cooperating stations showed improvement over that obtained in previous years. It is hoped that further improvement can be obtained in future cooperative efforts. Fragmentary data do not make a satisfactory summary.

R. G. Rothgeb, Chairman

Summary of Data for Sweet Corn Hybrids Grown for Observation in 1950 by Members of the Northeastern Corn Improvement Conference

| Hybrid | Seed source (Sta.) | Days to mid-silk[1] | Plant height Ins.[2] | Definite wilt injury[3] | Relative Yield-% of test means[4] Wt. | No. | Usable ears %[5] | Ear length Ins.[6] | Ear width Ins.[7] | Modal ear row No.[8] | Kernel width Score[9] | Flavor - tenderness Score[10] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Exp. 106 | N.J. | 57 | 65 | Yes | 102 | 88 | 75 | 7.7 | 1.81 | 12 | 7 | 3-4 |
| Exp. 249 | Me. | 58 | 67 | Yes | 86 | 91 | 71 | 7.2 | 1.76 | 14-16 | 4 | 3-3 |
| N.J. 101 | N.J. | 60 | 73 | No | 131+ | 119+ | 78 | 7.9 | 1.74 | 12-14 | 5 | 3-3 |
| N.J. 105 | N.J. | 60 | 68 | Yes | 117 | 119+ | 68 | 7.4 | 1.73 | 12 | 5 | 3-4 |
| Walden | Conn. | 60 | 69 | Yes | 77* | 83* | 74 | 7.7 | -- | 12 | 5 | 3-2 |
| Dirigo | Me. | 61 | 70 | Yes | 79 | 88 | 70 | 7.6 | 1.75 | 14 | 4 | 2-4 |
| Jackson | Conn. | 61 | 70 | Yes | 80* | 95* | 65 | 7.2 | -- | 12 | 4 | 2-2 |
| Exp. 103 | N.J. | 62 | 73 | Yes | 115+ | 111+ | 66 | 7.2 | 1.66 | 14 | 5 | 3-3 |
| Exp. 104 | N.J. | 62 | 76 | Yes | 120+ | 84 | 74 | 8.2 | 1.98 | 12-14 | 7 | 3-3 |
| Exp. 102 | N.J. | 63 | 72 | No | 111 | 113 | 75 | 7.5 | 1.75 | 12-14 | 4 | 3-3 |
| C820-M32 | Me. | 63 | 65 | Yes | 95 | 99 | 64 | 7.5 | 1.74 | 14 | 4 | 3-3 |
| Rutledge | Conn. | 63 | 67 | Yes | 81* | 87* | 80 | 6.7 | -- | 12 | 5 | 3-3 |
| Imp. C | Me. | 64 | 69 | Yes | 91 | 93 | 67 | 7.3 | 1.75 | 14 | 4 | 3-3 |
| Exp. 4 | Md. | 65 | 70 | No | 101 | 126+ | 68 | 7.8 | 1.58 | 12 | 6 | 3-3 |
| Exp. 1 | Md. | 66 | 70 | No | 93 | 109 | 72 | 7.8 | 1.60 | 12 | 4 | 3-3 |
| Hyb. E | Me. | 66 | 64 | Yes | 89 | 89 | 71 | 7.7 | 1.69 | 14 | 5 | 3-4 |
| M32-E | Me. | 66 | 69 | Yes | 98 | 92 | 70 | 8.1 | 1.80 | 14 | 4 | 2-3 |
| Col. Cr. B. | F.H.W. | 68 | 74 | Yes | 99 | 85 | 74 | 7.7 | 1.73 | 12-14 | 5 | 3-2 |
| Exp. 2 | Md. | 68 | 81 | No | 114+ | 107 | 73 | 3.3 | 1.73 | 12 | 5 | 3-3 |
| Exp. 3 | Md. | 70 | 76 | No | 119 | 113 | 79 | 7.5 | 1.69 | 12-14 | 4 | 3-2 |
| Pershing | Conn. | 72 | 84 | No | -- | -- | -- | -- | | 14-16 | 4 | -- |
| Brookhaven | Conn. | 74 | 86 | No | -- | -- | -- | -- | | 14 | - | -- |

1 Me. and Md. planting dates: Me., May 30; Md., June 16. Av. all entries: Me., 73 days; Md., 55 days.
2 Me. and Md. av. all entries: Me. 78 ins; Md., 65 ins.
3 Md. and N.J. with one or more plants showing severe injury.
4 Av. relative total yield for Conn., Me., Md., and N.J. *Except N.J. +Above av. at all 4 locations.
5 Me., Md., N.J. 6 Conn., Me., Md., N.J. 7 Me., N. J. 8 Conn., Me., Md.
9 Me., N.J. 1-very narrow and 9 very wide.
Score 1 to 5. 1 most desirable, 5 least desirable. Flavor on left, tenderness on right.

## Discussion of Research Problems (Cont.)

### Male Sterility

The group asked Dr. D. F. Jones to discuss male sterility and to tell something of its status at this time relative to use in hybrids.

Dr. Jones indicated that the testing of semisterile hybrids is continuing and results thus far seem encouraging. Where semisterile hybrids have been compared with regular hybrids, of the same pedigree, yields from semisterile hybrids have been as good and in some cases better than the normal hybrids.

Dr. Jones described the relative ease with which genotypes can be recovered when backcrossing to cytoplasmic steriles, two or three back crosses being all that were necessary. He emphasized caution in not proceeding too rapidly with the recoveries. When selection for type is made too early by the time of the third backcross reduction in vigor may go beyond that of the recurrent parent.

Differences have been found among inbred lines in the ease with which male sterility can be incorporated. In general lines that are sparce pollen producers under certain conditions, like WF9, become male-sterile more readily than lines that produce pollen profusely.

The final degree of sterility obtained depended somewhat on the source of the cytoplasmic male-sterile line used. Connecticut is using three sources designated by the superscripts S, T, and B, and standing for Connecticut, Texas and Brazil respectively. The Texas male-sterile has proven to be better than the Connecticut source.

When making the male-sterile single cross it may be necessary to employ sublines of the male parent in order to retain complete male sterility in the single cross.

Two distinguishing characteristics of male-sterile plants were described by Dr. Jones. Male-sterile plants are characteristically slightly dwarfed above the ear as compared to male fertile plants of the same line, and the tassels of such plants have never been found to show anthers even on partially fertile plants until they are entirely extended.

### Corn Diseases

The principal interest of the Conference was in stalk rot disease. Resistance was discussed as possibly being correlated with other characters such as high sugar content of the stalk.

## Report of the Nominating Committee

The Nominating Committee met and by a unanimous vote chose Dr. J. S. Cartledge as Vice Chairman for the coming year.

The meeting was then turned over to the new Chairman, Dr. R. G. Wiggans.

Plans for the next meeting were discussed. It was decided to hold the Seventh Northeastern Corn Improvement Conference in New York City, February 8 and 9, 1952. The specific meeting place to be chosen at a later date.

## STATION REPORTS

### NEW JERSEY

#### NEW JERSEY AGRICULTURAL EXPERIMENT STATION, New Bruswick

#### Corn Work at the New Jersey Station

John C. Anderson. Corn work at the New Jersey Station is divided into two categories -- corn breeding and corn culture. The corn breeding consists first of segregating and isolation of inbreds from open-pollinated varieties. A new set of varieties is initiated every third year in order to have a steady stream of inbreds available. The second phase is the testing of single and double crosses with considerable emphasis on the selection of resistance to lodging and stalk rot. A third phase of the corn breeding program is the testing of hybrids and how they respond to different rates of post emergence applications of 2,4-D.

Corn culture includes a rotation management study with Dr. Oren Neal of the S.C.S. In it, a study is being made of a most efficient place in the rotation to apply the bulk of the fertilizer which corn requires. So far it appears that direct applications are most beneficial and efficient. A study of 6 hybrids planted at 3 rates of planting indicates no significant interaction. A test of a dwarf hybrid vs. two standards at 3 levels of plant population indicates that the standard hybrids tolerate high rates of planting much better than does the dwarf. A preliminary test of rate and placement of fertilizer on corn shows that fertilizer applied with the seed in as small amounts as 200 lbs. per acre are definitely injurious to the stand. Band applications as against surface applications showed a definite advantage in yield. Another phase of corn work is a cooperative study with Dr. Aldrich our weed specialist on the role of cultivation in corn production. It appears that even in dry years when there are no weeds to be eliminated, cultivation serves some good purpose, not yet understood, in producing better yields of corn.

## Current Research on Field Corn in New Jersey

### Corn Culture

1. Rotation management in its third year shows direct application of fertilizer produces higher yields than does equivalent fertilizer applied on the clover preceding the corn.

2. Sweet clover and subsoiling alone and in combination on rundown land indicate that sweet clover by itself is very effective in production of corn.

3. Hybrid x Rate of Planting interaction.

4. Rate and placement of fertilizer on corn with special reference to row applications at planting time.

5. Dwarf vs. normal corn. Yield and adaptation.

### Corn Breeding

1. Double crosses of both the station and Northeastern Corn Conference origin.

2. Topcross test of new inbreds.

3. Isolation and selection of new inbreds with reference to:

   a. Stalk rot resistance

   b. Ear characteristics

   c. Pollen production

   d. Smut resistance

   e. Ear height

   f. Leaf blight

4. Testing of both open and closed pedigreed hybrids out in the state to determine relative yield and adaptation.

## Report of Sweet Corn Research At New Jersey

R. S. Snell. As far as breeding and seed production of sweet corn are concerned New Jersey is presently most concerned with the following:

1. Successful Western production of seed of its most promising experimental hybrids with present accent on New Jersey Experimental Hybrid #101.

2. Continued breeding to meet the following hazards of commercial sweet corn production in New Jersey.

a. Stewart's disease - the present status of sweet corn hybrids particularly of the early season relative to this disease is no cause for complacency. Recent severe natural occurence of the disease in our state have been utilized to the full for selection of resistant stocks.

b. Smut - Selection based on natural occurrence of this disease is the present attack on smut. A better approach is being sought.

Insects - Only against aphids is there much present confidence of breeding resistant types. Chemicals are our present best guard against borer, earworm and sap beetle.

Production - This is a factor that our growers never let us forget and rightly. Any other improvements must be added to high production.

Quality - Most of our quality selection has been subjective to the present. As opportunity affords we are trying to find ways of being more objective. Some use is being made of special sugary genes to "doctor" some of our productive but quality-wise less successful hybrids, apparently with some success.

Earliness - There seems to be no end to the search for progressively earlier hybrids. It's a real chore to combine the positive qualities just enumerated with extreme earliness.

We welcome every effort on the part of the Sweet Corn Committee of this organization to further cooperation among the sweet corn workers of all of the experiment stations represented.

In conclusion it should be pointed out that along with breeding and seed production the New Jersey Experiment Station carries on extensive research in cultural practices, disease and insect control, and the marketing of sweet corn.

MAINE

MAINE AGRICULTURAL EXPERIMENT STATION, Orono

## Corn Improvement in Maine

R. M. Bailey. Corn improvement research at the Main station is quite limited in extent because of the relatively minor importance of this crop in Maine. The major emphasis of work in progress is with sweet corn and consists of projects concerned with borer control, chemical weed control, and sweet corn breeding. With field corn improvement, one breeding project is in progress.

The primary objective of the sweet corn breeding work is to develop better quality and better adapted hybrids that mature earlier than Golden Cross Bantam. Several single-cross and three-way hybrids involving Maine inbreds are in limited commercial use. Maine inbreds that are or have been used commercially are nos. 1, 2, 100, 135, and 244. Purdue 1339 is used with the last three in several combinations in producing late hybrids for commercial use. Mass. 32 inbred appears to offer some promise as a substitute for P. 1339 in making these crosses because of its earlier maturity. Maine inbreds 1 and 2 have attained limited commercial use for production of market and home garden hybrids in several sections of the country. Some attention has been given to the development of white sweet corn inbreds. Although several are promising, none have reached the commercial stage as yet. Major emphasis in the breeding program is devoted to the search for new better lines by crossing, followed by inbreeding or backcrossing, and later testing in hybrid combination with tester lines and as topcrosses. A rapid objective method for comparing quality of many inbreds in the field is needed to speed up the work of selection.

In field corn breeding we are devoting most of our efforts to breeding stocks which produce hybrids that mature as early as or earlier than W240 because of our short growing season. Several excellent dent hybrids are commercially available that are sufficiently early maturing for silage but are too late for grain. At present W240 (Maine B) is commonly used for both silage and grain. Experimental flint-dent and flint hybrids are under study. Comparisons in 1946 and 1947 suggest that the flints may be of especial interest because of their early maturity and high protein and fat values.

| Type | No. of varieties | Protein percent | Fat percent |
|---|---|---|---|
| Flints | 6 | 14.2 | 5.3 |
| Flint dents | 7 | 12.5 | 5.4 |
| Dents | 4 | 11.6 | 4.7 |

In 1950, a cool dry growing season with early fall frosts, ten experimental three-way flints exhibited better performance for grain than flint-dents. These hybrids are three-way combinations involving Maine and Canadian lines in various $F_1$ combinations crossed with W15 as the pollen parent. One three-way flint-dent hybrid that appears promising is W85 x W15 x SD105. A trial seed plot was grown in 1950 with excellent results and sufficient seed is available for distribution to all who may be interested in testing it. Other experimental seed lots of about this maturity class which are available for trial consist of approximately 15 three-way flint dents obtained by crossing other early $F_1$ flints with SD105 dent inbred.

The Maine Station cooperated with the Massachusetts Station last season in producing hand pollinated seed of 19 double crossed early dents for the 1951 uniform trials. These have SD105, SD106, A96, A15, NH500, C105, WD, and Mich. 1341 in their parentage.

## MASSACHUSETTS

### MASSACHUSETTS AGRICULTURAL EXPERIMENT STATION, Amherst

Hrant M. Yegian. Reasonable progress is being made in the production of dwarf corn hybrids. Numerous early maturing established inbred lines have been crossed with a dwarf line and later selfed and selected with emphasis on getting early maturing dwarf lines. A few of these new lines have given good performance, both in yield and other important agronomic characteristics in single cross tests. Most of the single crosses were 3.5 to 4 feet high and had 13 or more normal size leaves per plant on strong, thick stalks.

The routine cooperative breeding work is being continued. Eleven very early new lines from Midwestern Experiment Stations were used in making all combination single crosses. Also 50 predicted best double crosses in W240 maturity group were made for testing in 1951.

## MARYLAND

### MARYLAND AGRICULTURAL EXPERIMENT STATION, College Park

#### Corn Improvement Work at the Maryland Station

R. G. Rothgeb. Corn has been and probably will continue to be Maryland's most important cereal crop. It occupies about a fifth of the state's cropland and excels all other grain crops in the state in the ability to produce digestible nutrients per acre. It is a major feed item in supporting the state's livestock industry.

Because of the importance of corn the Agronomy Department of the Maryland station has devoted considerable attention to its improvement. For some years a strenuous effort has been made to find or breed hybrids most suited to the needs of the state. The aim has been to channel good hybrids regardless of origin into use as soon as their worth was definitely established. There has been little tendency to hold off until the station could breed its own hybrids. As a result of this policy the station's breeding program has received somewhat less stress than its testing program. On the other hand, farmers in all sections of the state have a list of hybrids upon which they can depend for good performance.

Insofar as hybrid improvement is concerned the station carries a general project which has the following objectives:

(1) To attempt to correct deficiencies in hybrid corn by replacement with new hybrids or by modifying hybrids now in use.

(2) To place good hybrids in the several maturity groups with respect to local conditions and farm practices.

(3) To study the effect of important cultural practices on the response of corn hybrids.

(4) To determine accurately the actual and relative growth period for hybrids planted at different times and places.

Under this project in 1950 six replicated hand-planted regional field tests were conducted, four in the Coastal Plain Region, one in the Central or Piedmont Region, and one at 2500 feet elevation in the western end of the state. Included in one or more of these tests were 42 open-pedigree hybrids (13 of them new experimental numbers), and 34 privately controlled hybrids. In the low-altitude tests three reference hybrids, namely, Iowa 939 (medium early), U.S. 13 (mid-season), and Illinois 448 (late) have been included from year to year.

A considerable portion of the station's breeding work is carried on in cooperation with corn conferences, principally the Northeastern Conference. In 1950 a 49-entry uniform experimental double cross test (U.S. 13 maturity) was conducted. Other breeding work involves the search for superior inbreds from local open pollinated varieties such as Reid Yellow Dent, Golden Queen, and Johnson County White, and from crosses involving lines with superior characteristics. Several lines obtained as a result of this work have produced good experimental crosses, but to date their over-all performance has not been considered good enough to replace the better lines now in use.

From time to time special problems related to hybrid improvement have been studied. In 1949 W. L. Haltiwanger, a graduate student, studied the comparative maturity rates of hybrids selected by the Northeastern Conference to represent maturity groups. Based on three planting dates at one low-altitude location and one planting date at a high-altitude location, his results indicate that for Maryland, at least, the selected reference hybrids do a rather poor job of dividing the maturity range between Wisconsin hybrid 240 and Illinois 448 into classes of equal size. Regardless of whether the mid-silk date or the date for cribbing maturity (25% grain moisture) was used as a criterion some of the reference hybrids usually fell together in the same class. Eventually, it should be possible to name hybrids more representative of several of the maturity groups.

In 1950 another graduate student, Phillip Trujillo, studied the effect of several practical treatments on the time of flowering of two single crosses, namely: WF9 x 38-11 and T8 x K115. Heavy mineral fertilization hastened flowering up to three days. Coating the seeds with mineral oil delayed flowering up to five days. Clipping 10-inch plants back to 4 inches delayed flowering from 3 to 7 days, but reduced the final size of the plants considerably. The results indicate in some cases, at least, split plantings between parental single crosses of different maturities may be avoided by appropriate treatment of the pollinator at planting time or during early growth.

Sweet corn for processing continues to be an important commercial crop in Maryland. From 35,000 to 40,000 acres are grown annually. A very much smaller acreage is grown for market as roasting ears.

At present, sweet corn work at the station involves testing and breeding under Agronomy; quality and processing studies under Horticulture; and insect control under Entomology. All three departments cooperate freely.

Breeding and testing continues to follow the pattern of procedure employed for field corn, but on a much less extensive scale. Each year a hand-planted replicated test is conducted at College Park. It includes entries from many sources - both commercial and experimental. Results on field observations are published annually.

The general objective for the breeding work is to combine good ear and kernel quality with large plant size, good vigor, and freedom from excessive suckering.

Horticulture has a well equipped laboratory for quality studies. Dr. Amihud Kramer has been doing intensive work on methods for evaluating quality in sweet corn. Considerable progress has been made in devising objective methods for determining maturity and tenderness. Less has been accomplished on the evaluation of flavor.

NEW YORK

NEW YORK AGRICULTURAL EXPERIMENT STATION, Ithaca

R. G. Wiggans and R. L. Cushing.

I. Utilization of present inbreds, local and introduced.

A. Evaluation of inbreds for use "as is" in production of hybrids.

1. Comparison of inbreds in replicated trials. One hundred seventy inbreds were grown in 1950. Many of these can be eliminated from further consideration because of poor adaptation, susceptibility to root and stalk rot, susceptibility to aphids, etc.

2. Comparison of inbreds in three-way crosses with good available single crosses. Most of the 170 inbreds mentioned above were crossed in 1950 with two single crosses, for test in 1951.

3. Comparison of inbreds in single crosses. One test, involving $F_1$'s of ten inbreds in all combinations was grown at three locations in 1950. Another, involving ten different inbreds, was made in 1950 for test in 1951. A single cross test supplied by the Pennsylvania station was grown at one location in 1950.

4. Double cross tests. Preliminary tests of experimental double crosses are grown at Ithaca. Promising double crosses were compared with commercial hybrids for grain and silage in seventeen regional trials in 1950. A comparable number of tests is planned for 1951.

B. Use of introduced and local inbreds in the improvement of specific characters of adapted inbreds.

1. Eight locally adapted inbreds have been crossed with from one to ten other inbreds, and have been backcrossed three times, with the objective of improving them in grain color, smut resistance, root and stalk rot resistance, and kernel type.

II. Development of new inbreds.

A. Pedigree selection. In 1951 there will be lines in the first, third and fifth selfed generations. These have come from several sources, including local varieties, varieties introduced from other states, double crosses, and foreign introductions.

B. Pedigree selection with early testing. Some selfs made for the first time in 1950 were top crossed for testing in 1951. It is planned to make additional top crosses of $S_1$'s in 1951.

C. Limited programs involving recurrent selection, reciprocal recurrent selection, and modified gamete selection were started in 1950.

III. Miscellaneous projects.

A. Sweet and popcorn. Continued inbreeding and evaluation of single crosses is being practiced on a limited scale.

B. Aphid resistance. A study is being made on the inheritance of aphid resistance, using controlled infestation under greenhouse conditions.

C. Disease resistance. The possibility of controlled tests, for evaluation of material for resistance to seed rotting organisms and for resistance to stalk rot, is being studied.

D. Induced mutation. Preliminary tests are underway on the usefulness of irradiation and chemical treatment for the induction of mutations of possible value in the breeding program.

PENNSYLVANIA

PENNSYLVANIA AGRICULTURAL EXPERIMENT STATION, State College

L. L. Huber. The 1950 program in Pennsylvania included maintenance of two breeding nurseries, one at State College and another at Hershey. Top crosses were grown at two locations, single crosses at four locations and double crosses at fifteen locations.

Top cross tests for 1950 included inbreds from the disease nursery conducted by C. C. Wernham at State College.

Increased emphasis is being placed on the development of hybrids earlier than Ohio K24. Progress has been made.

As more new and earlier lines become available the testing program is shifting to greater emphasis on single cross tests and less emphasis on double crosses. The limitation on the number of double cross tests is largely a matter of time and economics. Since a major objective of corn breeding is to reduce instability of production, increased emphasis is placed on measuring as many biotic factors or their influence as may appear on inbreds and single crosses. Wherever possible the relationship of the biotic factors to morphological and physiological characteristics of the plant are investigated.

In cooperation with the New York Experimental Station a uniform inbred line test was conducted in 1950. This sort of test will be expanded in 1951.

Observation planting of 83 hybrids, including both closed and open formula were made at two locations in 1950. Data on relative maturity and insect and disease susceptibility were obtained. Many hybrids may be discarded on the basis of their behavior in relation to important biotic factors.

In cooperation with J. D. Sayre, Ohio Agricultural Experiment Station, continued work on the meaning of magnesium deficient plants relative to yield is being conducted. Several new Pennsylvania inbreds were also tested for cold tolerance by Dr. Sayre.

Plans are now under way to undertake a fairly comprehensive cold tolerance program at State College. This program will include major emphasis on methods as well as strains in 1951.

Inbred lines, and hybrids are studied with special reference to insects, particularly the corn leaf aphid and the Japanese beetle by B. F. Coon, entomologist. These insects are being investigated with particular reference to their bio-physical and bio-chemical requirements. Such studies tend to point up the nature of desirble adaptative characters. Studies on pollen dispersal were conducted in 1950. The results will be published.

WEST VIRGINIA

WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION, Morgantown.

J. L. Cartledge. The corn breeding program is limited in size by the facilities and personnel available. We are testing experimental single and double cross hybrids on five state farms, and in 1950 ran one of the uniform Northeastern corn test of U. S. 13 maturity. We are making up some 34 Northeastern experimental numbers for test and comparison next year. A few new lines are being produced, some of them from native open-pollinated strains. Emphasis at present is on production of hybrids needed for the corn growing regions at altitudes from 2000 to 3200 feet. Special problems include improvement of inbred W.Va. 12 (B.M. Ritter) and survey and breeding for sugar content in fodder (C. W. Neal). We have, in cooperation with the Extension Division, demonstration trials scattered through the State. We are also attempting to produce the relatively small amounts of foundation seed stock required by the Associated Crop Growers for production of certified seed, especially for W. Va. B-25 and W. Va. B-17.

## ROSTER OF ATTENDANCE

| | | |
|---|---|---|
| **Connecticut** | | |
| Everett, H. L. | Connecticut Agricultural Experiment Station | New Haven |
| Johes, D. F. | Connecticut Agricultural Experiment Station | New Haven |
| **Maryland** | | |
| Findley, Wm. R. | Plant Industry Station | Beltsville |
| Rothgeb, R. G. | Maryland Agricultural Experiment Station | College Park |
| **Massachusetts** | | |
| Yegian, H. M. | Massachusetts Agricultural Experiment Station | Amherst |
| **New Jersey** | | |
| Anderson, J. C. | New Jersey Agricultural Experiment Station | New Brunswick |
| Hill, D. D. | New Jersey Agricultural Experiment Station | New Brunswick |
| Ilnicki, R. D. | New Jersey Agricultural Experiment Station | New Brunswick |
| Shull, G. H. | Princeton University | Princeton |
| Snell, R. S. | New Jersey Agricultural Experiment Station | New Brunswick |
| **New York** | | |
| Cushing, R. L. | Cornell Agricultural Experiment Station | Ithaca |
| Randolph, L. F. | Division of Cereal Crops & Diseases, USDA. | Ithaca |
| Wiggans, R. G. | Cornell Agricultural Experiment Station | Ithaca |
| **Pennsylvania** | | |
| Huber, L. L. | Pennsylvania Agricultural Experiment Station | State College |
| **West Virginia** | | |
| Cartledge, J. F. | West Virginia Agricultural Experiment Station | Morgantown |
| Neal, C. W. | West Virginia Agricultural Experiment Station | Morgantown |

## OFFICERS AND COMMITTEE MEMBERSHIP, 1951

Referee - A. J. Heinicki

### Executive Committee

| | |
|---|---|
| Chairman | R. G. Wiggans |
| Vice Chairman | J. L. Cartledge |
| Member-at-large | J. C. Anderson |
| Acting Secretary | R. S. Snell and Wm. R. Findley |

### Committee on Uniform Tests of Double Crosses

L. L. Huber, Chairman
B. F. Coon
H. L. Everett
C. M. Haenseler
R. S. Wiggans

### Committee on the Registration of "Eastland" Hybrids

D. F. Jones, Chairman
L. L. Huber
R. G. Rothgeb

### Committee on Sweet Corn Investigations

R. G. Rothgeb, Chairman
R. M. Bailey
C. H. Dearborn
W. H. Lachman
M. T. Lewis
W. R. Singleton
R. S. Snell

### Committee on Statistical Designs for the Uniform Comparisons

C. E. Phillips, Chairman
C. I. Bliss
H. M. Yegian

### Committee on Cold Tests

C. C. Wernham, Chairman
H. L. Everett
R. L. Cushing

Committee on Uniform Tests of Field Corn Inbreds

L. L. Huber, Chairman
C. M. Haenseler
R. G. Wiggans

Committee on Uniform Tests of Hybrids

W240 Maturity - H. M. Yegian, Chairman
R. M. Bailey

W355, W412 and
M15 maturities - L. L. Huber, Chairman
R. G. Wiggans
H. M. Yegian

K24 and Ia.4059
maturities - J. L. Cartledge, Chairman
H. L. Everett

U.S. 13 and Ill.
448 maturities- J. C. Anderson, Chairman
R. G. Rothgeb
H. L. Everett

LIST OF NORTHEASTERN EXPERIMENT STATIONS

| | |
|---|---|
| Connecticut | New Jersey |
| Delaware | New York |
| Maine | Pennsylvania |
| Massachusetts | Rhode Island |
| Maryland | Vermont |
| New Hampshire | West Virginia |